



Novel Technologies for a Competitive Food Industry

Teagasc Food Research Centre,
Ashtown, Dublin 15

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Welcome to Food Innovation Gateways: Novel Technologies for a Competitive Food Industry

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Stand 1

Ultrasonication of Powders

Presenter: Noel McCarthy

Generally, non-agglomerated spray dried milk powders reconstitute readily with the aid of mechanical stirring. However, new generation dairy ingredients such as milk protein concentrates (MPCs) with very high protein concentrations (>80%) are proving to be much more difficult to reconstitute compared to commodity dairy powders. Detailed studies at Moorepark are providing some insights into the mechanism of MPC rehydration using both physical (ultrasonication, cavitation) and chemical (citrate salt) means.



Stand 2

Novel Extraction Technologies

Presenter: Zhihang Zhang

Teagasc offers expertise and facilities in novel extraction methods to generate functional and valuable ingredients. Our laboratories are equipped with a range of state-of-the-art equipment for conventional and novel extraction technologies such as power ultrasound, microwave and supercritical extraction. We can facilitate the development of environmentally-friendly and efficient extraction technologies for the recovery of valuable and functional ingredients such as polyphenols, polysaccharides and proteins from plant and animal sources. These functional ingredients can be used for a variety of applications including food, cosmetic and medical. Coupled with the bio-processing facilities in Teagasc, the physical and chemical profiles and the biological activities of the extracted compounds can be evaluated.



Stand 3

BioTransformation using Fermentation Technology

Presenters: Mary Rea and Olivia McAuliffe

The potential to exploit microbial fermentation to add functionality and value to foods and food ingredients is well recognised. Within Teagasc, significant and long standing expertise is available in the identification and exploitation of starter cultures associated with dairy based fermentations. More recently this expertise has been expanded into the areas of fermentation directed towards the development of high added value bio-functional ingredients. Teagasc Moorepark has considerable infrastructure dedicated to this research area and has fermentation vessels ranging from 100ml to 3L at laboratory scale in addition to pilot scale apparatus operational at a 15L scale. This is supported by downstream processing including Ultra and Micro-filtration systems and ancillary analytical capabilities.

Stand
4

Packed Bed Reactor System

Presenter: Sean Hogan

Although significant advances have been made in the development of proteins as ingredients in infant milk formulae relatively less research effort has been directed at lipids. Recent years, however, have seen increased interest in providing a fat source that more closely resembles human milk fat, the composition and structure of which differ significantly from most other animal and vegetable fats. Research at Teagasc has examined the potential of bovine milk fat, which when combined with vegetable oils can be modified enzymatically to produce human milk fat mimetics. Work to date has characterised a range of candidate enzymes and seeks to develop continuous, packed-bed reactor systems that will allow scalable, commercially viable production of human milk fat substitutes. Exploiting the potential of bovine milk fat for use in infant milk formula represents an important, alternative market stream for milk fat within the Irish dairy industry.



Stand
5

Post-Drying Technologies

Presenters: Song Miao and Junfu Ji

Teagasc have capability and expertise to restructure food powders or agglomerates using post-dehydration technologies, including granulation, coating and instantisation (dispersibility upon reconstitution). This technology is based on understanding the effect of formulation and drying parameters on the behaviour of different agglomeration techniques with a view to altering powder reconstitution properties. The goal is to manufacture high-quality, particulate products, with tailored functionality, for a wide range of end-user applications. The work also aims to improve processability through to final application, and to examine problematical functional attributes such as caking, segregation, electrostatic and solubilisation.

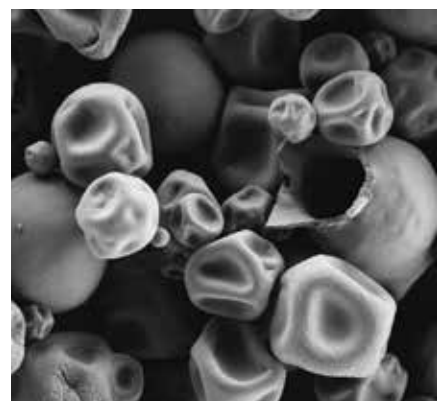


Stand
6

Structuring Foods for Optimised Quality

Presenter: Mark Auty

The National Food Imaging Centre (NFIC) comprises unique state-of-the-art microscopes for characterising food structure. Understanding the structure of food materials at the nano- and micro-levels gives unique insights into food behaviour. We use these food nanotechnology tools to troubleshoot and develop new food products in partnership with the Irish Food Industry. Applications of this research include improving creaminess in yoghurts and optimising quality of dairy powders. The NFIC is a very cost-effective troubleshooting service for Industry that can lead to significant production cost savings.





Stand 7

Sensory Food Network Ireland

Presenters: Emily Crofton, Eimear Gallagher and Sinead McCarthy

Teagasc is currently co-ordinating a national network of excellence in the area of sensory food science. This network brings together experts in all areas of sensory food science from 10 research institutions throughout the island of Ireland. The network combines all existing sensory services, expertise and capabilities in the country, and works as a sustainable unit to address documented needs/gaps by the food industry in relation to sensory science. It ensures that good practice and the highest level of service will be assured to industry. The network actively encourages and facilitates collaboration between industry and research groups. Sensory Food Network Ireland forms an integral part of food and beverage industry to support new product development, product matching, flavour development and enhancing understanding of consumer behaviour within specific market segments. As well as a first class service to industry, an ultimate goal of the network is to aspire to the highest level of scientific excellence in sensory food science research.



Stand 8

Consumer and Market Research

Presenters: Maeve Henchion and Sinead McCarthy

Knowledge and insights regarding consumers' wants, needs and perceptions are essential for focusing innovation efforts as well as developing and marketing new products. Linked with an understanding of innovation and technology transfer processes, organisations can significantly improve their innovation performance. Based on strategic research in these key areas, Teagasc can provide advice on consumer behaviour and attitudes, innovation management, market development and food policy. This provides direction for a range of stakeholders from food science researchers and support agencies to industry at all stages of the innovation process.



Stand 9

Technology Transfer

Presenters: Miriam Walsh, Sarah Cahalane and Sharon Sheahan

Teagasc Technology Transfer Office aims to be a major conduit for effective technology transfer of research outputs to end users, especially through partnering with industry and joint research and licensing opportunities. In implementation of Teagasc technology transfer strategy, the TTO serves to facilitate and support the transfer of IP and research outputs between Teagasc and end users, with benefits of social and economic importance. For further information, or enquiries on how to partner with Teagasc research, contact techtransfer@teagasc.ie or visit www.teagasc.ie/research/collaboration/

Stand
10

Food Safety and High Pressure Processing

Presenters: Geraldine Duffy, Kaye Burgess and Martin Danaher

We at Teagasc undertake R&D focusing on microbial contaminants in the “farm to fork” chain. We offer expertise in food pathogens including, *verocytotoxigenic E. coli*, *Salmonella*, *Listeria monocytogenes*, *Campylobacter* and *Cronobacter*. Our researchers use microbiological, genomic, proteomic and mathematical modelling tools to detect and track pathogens and address their behaviour and survival in the food chain. In addition, our research programme addresses the development of novel interventions and strategies, including novel processes such as high pressure processing. High Pressure Processing (HPP) offers numerous opportunities for developing foods with extended shelf-life, high nutritional value and excellent organoleptic characteristics and offers a novel approach to thermal processing. At Teagasc we have considerable expertise in HPP and the resultant effect on food product shelf life and pathogen control.

In addition, Teagasc residue laboratories are accredited to ISO17025 standard and are also a National Reference Laboratory for chemical contaminants. The accreditation scope includes antiparasitic drugs, anticoccidial, nitrofurans and pesticide residues in food of animal origin. The laboratory is equipped with state of the art equipment allowing us to analyse almost any chemical component in foods and beverages. Specific methods can be developed on request and accredited if required.



Stand
11

Power Ultrasound for Meat Curing

Presenter: Ciara McDonnell

Teagasc have conducted several studies that demonstrate the usefulness of power ultrasound for the accelerated processing of cured meat products. The application of power ultrasound to meat processing is novel and has several advantages compared to traditional curing and modern injection techniques. Traditional curing methods are slow and labour intensive, while modern injection techniques can result in quality issues. The Ultrasonic Laboratory at Teagasc is equipped with high-intensity ultrasonic probes, ultrasonic baths of various frequencies and several other modern technologies that allow companies and collaborators to trial various curing methods and processes. In addition the staff have extensive knowledge concerning the application of power ultrasound for meat preservation, ingredient development and scale-up.





Stand 12

Plasma Technologies

Presenter: Maria Ortega

Teagasc in collaboration with BioPlasma Group, DIT and DCU are working on plasma technologies for various food applications including meat surface decontamination, fish decontamination, dry food ingredients, fruit and vegetables with the aim of improving the food safety profile with minimal impact on food quality. Plasma technology is an emerging disinfection method that offers an exciting nonthermal approach to the reduction of microbial populations. Various reactive species of plasma interact with the biological cells to cause permanent changes in them at cellular level and in their morphology, leading to inactivation. Although cold plasma technology is not used commercially on a large scale, the equipment is readily scalable. This technology is increasingly finding acceptance among food processors for surface sterilisation and combating biofilm formation.



Stand 13

Technology Development Supports for Food SMEs

Presenters: Carol Griffin and Carmel Farrell

A key requirement for successful food businesses is the capacity to produce high quality and safe food products. Teagasc is committed to assisting the food sector by providing access to applied research knowledge, product development facilities and training programmes. Teagasc's team of highly skilled food technologists, microbiologists, chemists, trainers and consultants can work alongside food companies to develop new and innovative products, provide technical solutions to in-company problems and deliver certified training courses to assist in the skills development of employees.



Stand 14

MTL and Scale-Up Facilities

Presenters: Kieran Downey and John Hunter

Moorepark Technology Limited (MTL) provides commercial pilot plant & research services for food industry customers. It is a joint venture company established by Teagasc with shareholders from the Irish Dairy Industry. MTL operates an modern pilot plant covering 3,000 sq. metres floor area and contains the most up-to-date and versatile pilot scale processing equipment. The plant is of sufficient scale to accurately simulate commercial food processing and has been assembled specifically for research/development and pre-commercial scale manufacturing in product areas such as dairy products and dried food ingredients. A €10m upgrade and expansion project is currently underway at the MTL facility and this will include a "Plug and Play Next Generation Technology Unit". Novel technologies currently being assessed at MTL include Forward Osmosis, Cavitation technology, Microparticulation and Microwave technologies.

Stand
15

Novel Membrane Filtration for the Food Industry

Presenters: John Tobin and Ciaran Fitzgerald

Teagasc is currently building a critical knowledge base focusing on separation technologies. Primary areas of expertise revolve around the complete deconstruction of milk by filtration and separation technologies, coupled with mapping of the physical partition of milk components during fractionation. The term cross flow filtration encompasses a group of membrane processing technologies including microfiltration, ultrafiltration, nanofiltration, reverse osmosis and forward osmosis. Today these technologies have gained widespread application with milk processors throughout the dairy industry, providing cost effective opportunities for the complete deconstruction of milk and the subsequent recombination of selected milk components, creating novel added value products to complement existing dairy commodity portfolios. In fact the dairy industry as a sector is one of the biggest end users of membrane technologies for food and beverage products, and is one of the major engines driving innovation in membrane design. Membrane filtration technologies can provide novel technical solutions and platform technologies to meet the challenges of adding value to both milk and whey, while also providing solutions to enhance the sustainability of milk and whey fractionation by reducing effluent and operational expenditure.



Stand
16

Novel Ingredients from Meat Processing Streams

Presenters: Anne Maria Mullen, Liana Drummond and Carlos Alvarez

The development of new processes and techniques for recovery of biomolecules with relevant techno-functional properties (e.g. gelation, emulsification etc.) and biological activities (antioxidant, antimicrobial, etc.) is a rapidly advancing area with the potential to enhance the economic performance and improve the environmental impact of the food industry. Our state-of-the-art laboratories are equipped for the extraction, purification and characterisation of bioactive and functional compounds from animal sources, including by-products or waste streams. Processing technologies for product generation include the use of novel nonthermal processes applied to selected processing steps to improve yields and/or quality of extracts compared to conventional treatments. The suite of bio-processing equipment available includes membrane filtration, bio-reactors, preparative scale chromatography, large capacity continuous centrifuges, ultrasonic probes and high pressure processing equipment, which can be coupled with high resolution NMR and mass spectrometry suites to characterise and recover compounds of interest for a range of applications such as food, pharma and medical.





Drying Technologies

Presenter: Mohammad Hossain

The potential of technologies for drying and food preservation has gained increased industrial interest and has the potential to replace, at least partly, the traditional, entrenched preservation methods, as the industry seeks to become more environmentally and economically sustainable. The drying of foods is a very important technique for the food industry and offers possibilities for ingredient development and the supply of novel products to consumers. Teagasc is equipped with range of drying equipment including freeze driers and spray driers operational both at laboratory and industrial scale. Teagasc has expertise in novel drying approaches which include microwave and ultrasound assisted drying to increase process efficiency while improving the quality of dried ingredients.

Additional Exhibitors

HPP Tolling

Presenter: Liam Murphy

HPP Tolling is an innovative company offering food processors in Ireland convenient access to High Pressure Processing (HPP) Technology. The company is the only HPP Tolling Station in the country and is supported by Enterprise Ireland, Teagasc and University College Cork. High pressure processing is an innovative technology that allows food companies to manufacture safer, clean-label preservative free products with extended shelf life. HPP Tolling gives all food companies in Ireland access to these benefits, supporting the continued growth and development of the Irish food industry at home and abroad. HPP Tolling uses a 420 litre capacity system from Hiperbaric, the world leading manufacturer of HPP equipment. The plant is located in Ireland's National Food Park 'FoodCentral' St. Margaret's, Co. Dublin, beside Dublin airport in close proximity to all major road networks as well as Dublin port.

NuWave Sensors

Presenters: Stephen Daniels, Ruairí Monaghan and Sue O'Neill

NuWave Sensors develops a range of smart air quality sensors designed to continuously monitor airborne contaminants in industrial and commercial environments where the stability of air quality is essential and rapid diagnosis of contamination events are crucial. Our technology includes a suite of advanced connected sensors and a cloud based data management and analytics system. This unique combination enables customers to detect and control contamination events and is implemented using a low cost, wireless and non-invasive technology which results in the reduction of overall air contamination production risks and expenses. We are based in Dublin, Ireland where we have our R&D and manufacturing base. Our team comprises of world-class scientists, engineers, designers and business professionals who are creating the future of connected sensor technology.



Little Samphire Island Seaweed

Presenters: Henry Lyons, Brid Ni Mhathúna and Eddie Murphy

This is a new Irish marine biotechnology enterprise which has been established to manufacture and market a range of high value products derived from marine algae. Wild marine macroalgae available in abundance off the Irish coast will be used as raw material for the early stages of the development followed by utilisation of cultivated algae at a later stage. Food supplements and nutraceuticals, consisting of micronised whole algae having bioactives in available forms, are the first products coming on-stream in 2017 under the Little Samphire Island brand. This will be followed by extraction and separation of high value ingredients using a biorefinery/integrated manufacturing process to obtain products including fucoidan, beta-glucans, polyphenols and semirefined alginates.



Department of Agriculture, Food and the Marine

Presenters: Patrick Barrett and Ruairí Colbert

The Department of Agriculture, Food & the Marine's (DAFM) mission is to lead the sustainable development of the agri-food, forestry and marine sectors and to participate in the sustainable development of the circular bioeconomy sector. This will be achieved through optimising the development of agri-food and bioeconomy sectors through the equal objectives of economic, social and environmental sustainability. The Department, its staff and State Agencies, play a vital leadership role in providing and encouraging an environment in which enterprise and delivery of public goods can flourish. The effective implementation of Food Wise 2025, through the monitoring of targets and driving of progress, chaired by Minister Creed, T.D., is core to the future development of the Food Wise 2025 cross cutting themes and sectoral targets. Food Wise 2025 is complemented by DAFM's Strategic Research Agendas for the Agri-food, Forestry and Marine sectors, namely SHARP - "Sustainable Healthy Agri Food Research Strategy", FORI - "Forest Research Ireland" and HOOW - "Harvesting Our Oceans Wealth". These strategies have been developed in consultation with our stakeholders and set out a guide to the research and innovation priorities and objectives required to complement the objectives, priorities and targets of Food Wise 2025. Furthermore, research in the areas of both food production and processing and food for health have been deemed a priority as a result of National Research Prioritisation Exercise and are considered part of the key priority areas where Ireland should further develop and maintain scientific and technical excellence to support business development. DAFM is leading the implementation of the action plans for these priority areas. In addition, DAFM fund pre applied type research across the agri-food spectrum under its three competitive research funding programmes namely FIRM, STIMULUS & CoFoRD and also co-funds transnational programmes such as the ERA-NETS, Joint Programming Initiatives (JPI's) and European Joint Programmes (EJP's) and the US-Ireland Programme. DAFM also promotes and supports participation in the EU Horizon 2020 Framework Programme for agriculture, food, forestry, marine and the bioeconomy in the main under Societal Challenge 2 and the Biobased Industries Joint Undertaking.





Enterprise Ireland

Presenter: Dorothy Timmons

Enterprise Ireland is the government organisation responsible for the development and growth of Irish enterprises in world markets. In this way, we support sustainable economic growth, regional development and secure employment. We have over 30 international locations facilitating access to more than 60 countries worldwide and all of our services are geared toward helping Irish companies build an international business. We work in partnership with Irish food entrepreneurs and food companies to help them to develop an export led business, expand, innovate, become more competitive and develop their management capability so they are well placed to win export sales on global markets and in turn create new jobs in Ireland. Enterprise Ireland will present a number of supports available to companies to develop their business, including collaborative R&D with Teagasc and third-level institutes.



Bord Bia

Presenter: Amy Bond, Consumer and Market Insight Team

Bord Bia's mission is to drive, through market insight, and, in partnership with industry, the commercial success of a world class food, drink and horticulture industry. An important part of Bord Bia's role is to support its members by helping them make better, more informed, strategic decisions. Consumer and market insight is central to this process. The consumer insight team, made up of insight, branding, marketing, research & library and information specialists, work with our client companies to unlock the consumer and market understanding needed to drive sales. At this event, we will share a selection of this recent research with visiting companies.



Teagasc Technology Foresight

Presenter: Jane Kavanagh

Teagasc Technology Foresight has identified emerging technology areas that will drive the competitiveness and sustainable growth of the Irish agri-food industry and bioeconomy sector over the next 20 years. Teagasc will prioritise these new areas of technology in its research programmes to support the sector in facing the challenges and opportunities that lie ahead. Connecting with both private and public organisations, we will work collaboratively to explore these sciences and to transfer the emerging knowledge.

